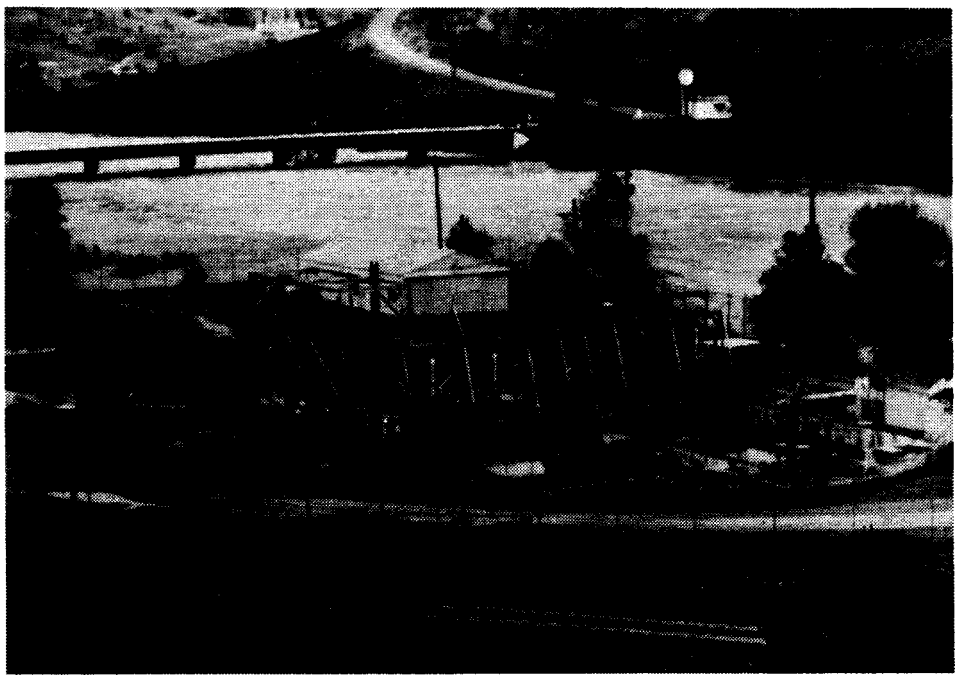
Idaho Power

OXBOW HATCHERY

1989 Annual Report
Steelhead and Spring Chinook



by

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (Cont.)

LIST OF APPENDICES

ABSTRACT

Adult steelhead returning to the Hells Canyon Dam trapping facility for the 1989 brood year numbered 2,729 (1,282 in the fall of 1988, and 1,447 in the spring of 1989). Five hundred and twenty-eight were planted into the Boise River, 76 were planted into the Payette river, 602 were planted into the Hells Canyon Reservoir, and 1,523 were held for spring spawning. Adult pre-spawning mortality was 35.3%, mostly due to a systemic bacterial infection (Pseudomonas-Aeromonas bacteria). The *high* rate of adult infection was a contributing factor to lesser egg quality and survival to eye-up. Three hundred and thirty-four females were spawned, yielding 1,321,000 green eggs. Survival to eye-up was 66%, resulting in 876,500 eyed eggs transferred to Niagara Springs Hatchery.

Spring chinook salmon trapping resulted in 84 adults and 3 jacks being trapped. All 87 fish were transferred to Rapid River Hatchery, where they were held for spawning.

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BROODRT

OXBOW HATCHERY AND HELLS CANYON DAM TRAP
1989 BROOD YEAR REPORT

Steelhead Trout and Spring Chinook Salmon

HATCHERY AND TRAP DESCRIPTION

Oxbow Fish Hatchery is part of the Idaho Power Company's hatchery system and has been in operation since 1962. The Oxbow facility is owned and funded by the Idaho Power Company (IPC) and operated by the Idaho Department of Fish and Game (IDFG). The primary purpose is to trap a sufficient number of returning steelhead and spring chinook to fulfill the Hells Canyon portion of IPC's anadromous fish mitigation requirements. Mitigation goals are to produce 1.3 million eyed steelhead eggs to be shipped to Niagara Springs Fish Hatchery and to ship all adult spring chinook trapped to Rapid River Fish Hatchery.

Oxbow receives its water from the Snake River (Hells Canyon Reservoir) and is located on the Oregon side, approximately 1/4 mile downstream from the IPC's Oxbow Hydroelectric Plant. Two production pumps (100 hp each) produce 20 cfs and two incubation pumps (10 hp each) produce another 0.5 cfs. Water temperatures range from a winter low of 33°F to a late summer high of 75°F (Figure 1). Water from the production pumps is distributed into four concrete holding ponds and/or six cinder block raceways. Incubation water enters the hatchery building and is distributed through a 4-inch line to 14 incubator stacks and 4 rearing vats.

Adult holding and production facilities include 4 holding ponds equipped with two electric crowding racks, 2 ponds measuring 105 ft x 30 ft x 5 ft providing 31,500 cubic feet of holding area and 2 ponds measuring 55 ft x 30 ft x 5 ft providing an added 16,500 cubic feet of holding area; 4 rearing vats, each with 30 cubic feet of rearing space; 2 repaired raceways, each with 1,700 cubic feet of rearing space; 4 raceways in need of repair that could each provide 1,700 cubic feet of rearing space; 14 double stacks of Heath Techna/FAL incubators containing 224 trays. The adult trapping facility consists of attraction pool, fish ladder, two weirs, fish trap, and a jib crane hoisted loading hopper, which is used to hoist trapped adult fish from the trap pool to a fish transport truck 80 feet above the trap. Fish are transported, via tank truck, 23 miles upstream to the Oxbow Hatchery.

STEELHEAD TRAPPING AND HOLDING

The adults returning to the Hells Canyon Trap in 1988 and 1989 were from smolt releases in 1986 and 1987. A total of 839,995 smolts were released in 1986, and 1,281,400 smolts were released in 1987. In both years, presmolts were released in the fall and the smolts in the spring.

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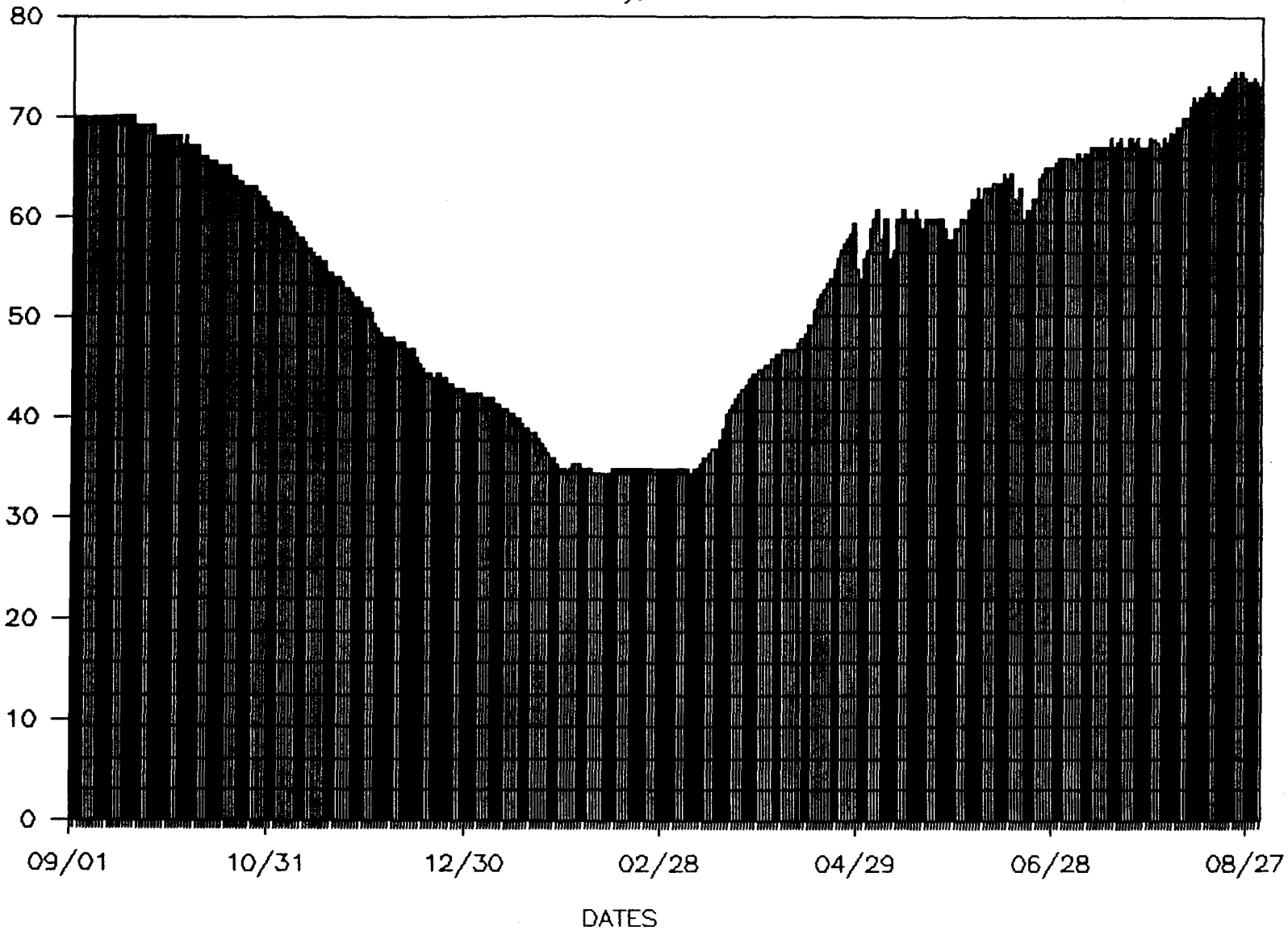
Figure 1. Water temperature profile,

Oxbow Hatchery, 1988–1989.



The Hells Canyon ladder and trap operated a total of 369 hours between October 31 and December 20, 1988, trapping 1,282 steelhead. Trap operations were resumed on March 1 and ran a total of 1,416 hours, trapping 1,447 adults by April 28, 1989. For 1988-89, 2,729 adults were trapped (Figure 2) in 1,785 hours, or approximately 1.53 fish per hour of trap operation. All fish were brought to the Oxbow Hatchery where they were sexed and measured (Figure 3 and 4). One thousand five hundred and forty females and 1,189 males were trapped. There were 859 females and 664 males held for spawning, with the remaining 1,206 released into the Boise (528), Payette (76), or Snake Rivers (602) (Hells Canyon Reservoir) to provide a sports fishery.

ADULT STEELHEAD TAG RECOVERY

Adult steelhead were examined for fin clips, jaw tags, floy (spaghetti) tags, and freeze brands. Of the 2,729 fish trapped, 68 (2.5%) had left ventral fin clips (coded wire tags), 8 (0.3%) were jaw-tagged with N.M.F.S. reward tags, 4 (0.1%) contained O.D.F.W. floy tags, and 2 (0.07%) were freeze-branded and had right ventral fin clips. The snouts were removed from the adults with LV fin clips and shipped to the tag recovery laboratory in Lewiston.

Adult fish were also examined to determine "wild" from hatchery fish. The presence and condition of all fins were used to determine the difference, with wild fish having perfect or nearly perfect fins, and anything with missing fins of deformed fin rays was considered a hatchery fish. There were 21 wild steelhead trapped (0.75% of 2,729); 9 in the fall of 1988 and 12 during the spring of 1989.

FISH HEALTH

Fall trapped adults began showing symptoms of bacterial infection early in January. Upon examination by Scott Footte, IDFG Pathologist, Pseudomonas aeruginosa, Pseudomonas putrefaciens, and Aeromonas hydrophilia were found in all moribund fish tested and determined to be the causative agents for mortality in adults being held at Oxbow. Testing for viral pathogens IHN and IPN prior to spawning were all negative, and twelve ovarian fluid pools during spawning showed similar results.

At three consecutive weeks (early to late January) of increasing mortality, all the adults were injected (into the dorsal sinus) with Oxytetracycline hydrochloride (5 mg/kg of body weight) for control of the bacterial infection. Mortality decreased within two days and remained low for seven weeks. By late March, the mortality of adults began to rise again, and after diagnosis of the same bacterial infection by Scott Footte, Oxytetracycline hydrochloride was administered. This treatment had no measurable affect on mortality (Figure 5).

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Figure 2. Run timing of adult steehead,

Hells Canyon – Oxbow 1988–89.

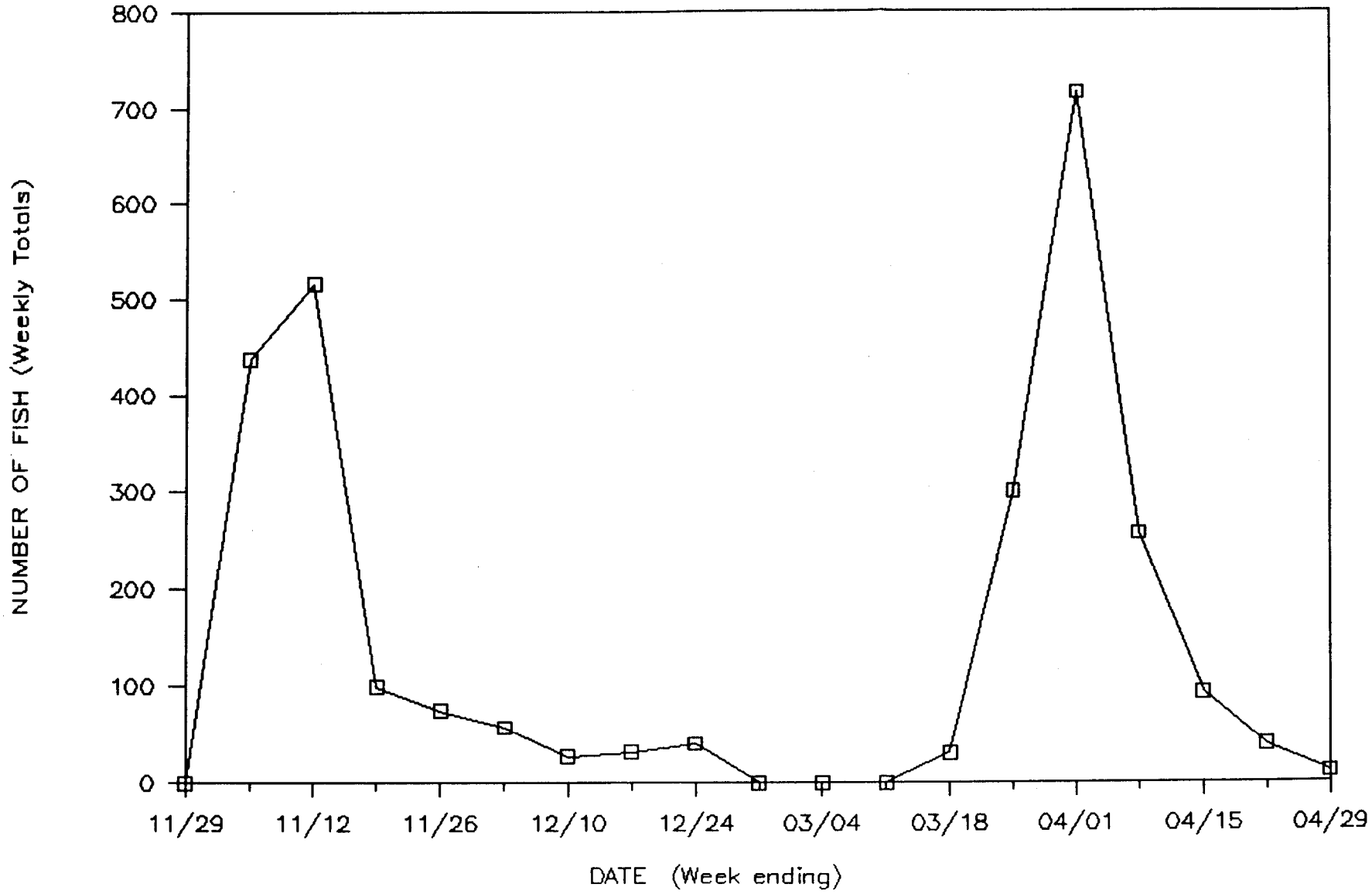


Figure 3. Length frequency distribution

of female steelhead, Oxbow, 1988–89.

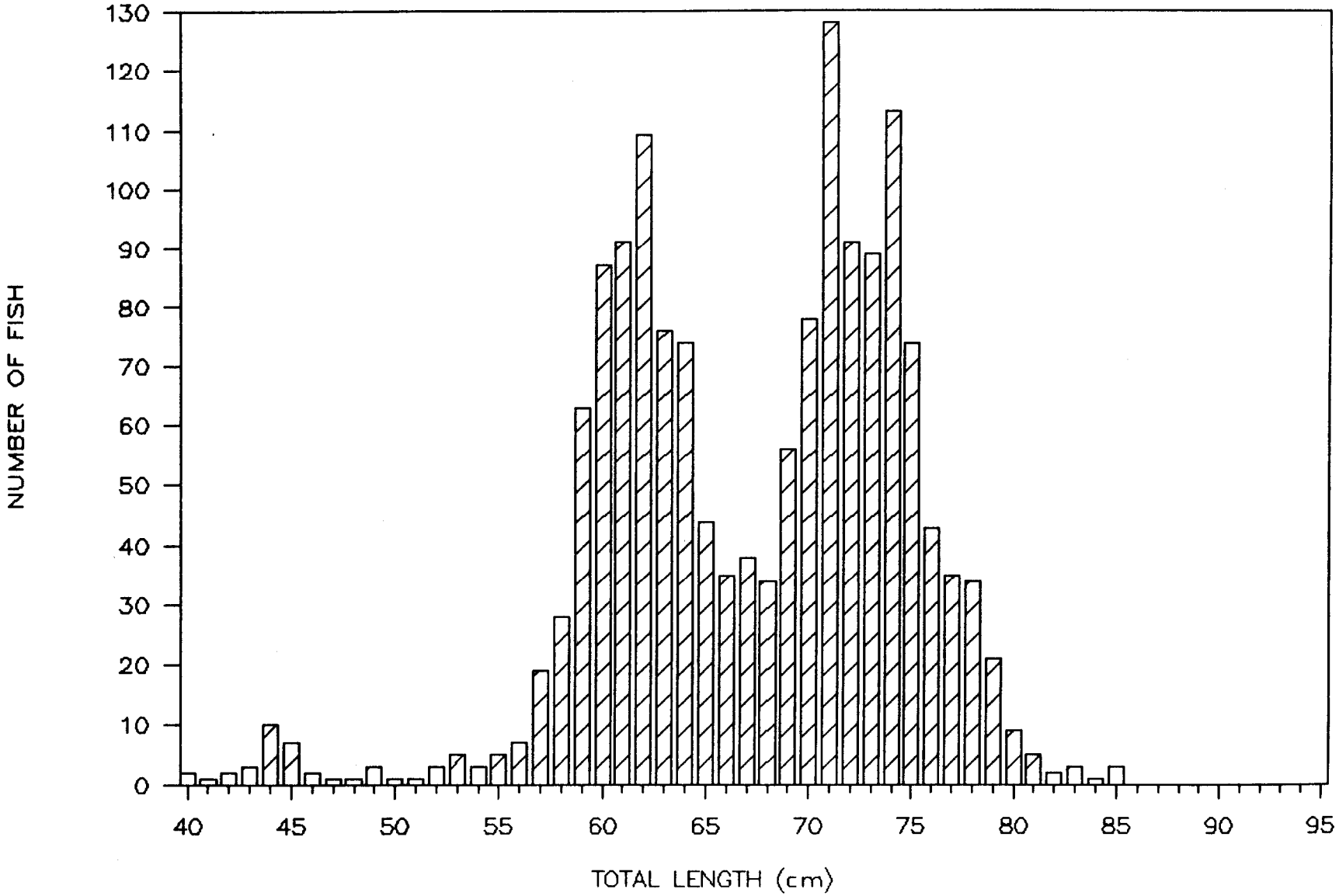


Figure 4. Length frequency distribution

of male steelhead, Oxbow, 1988–89.

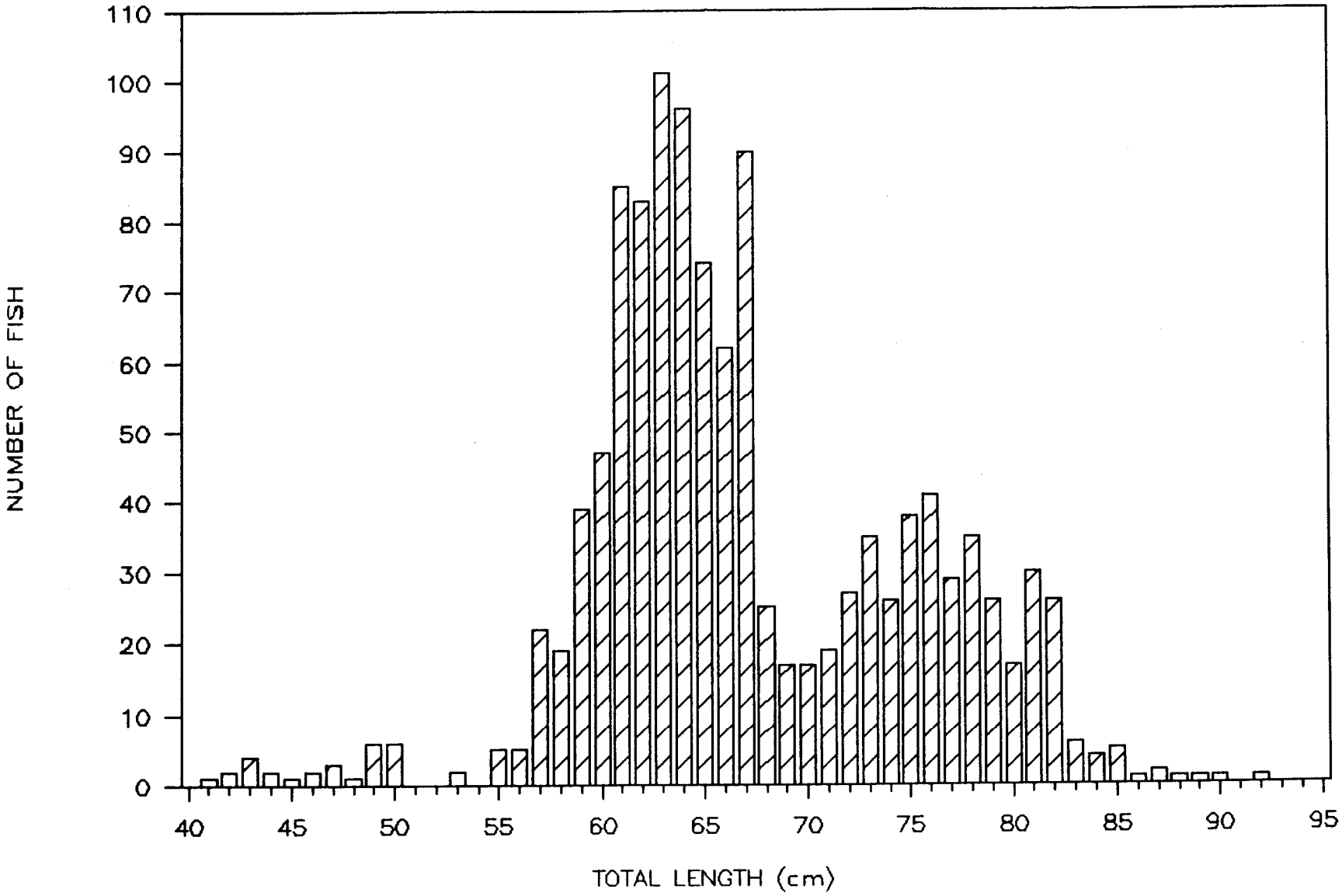
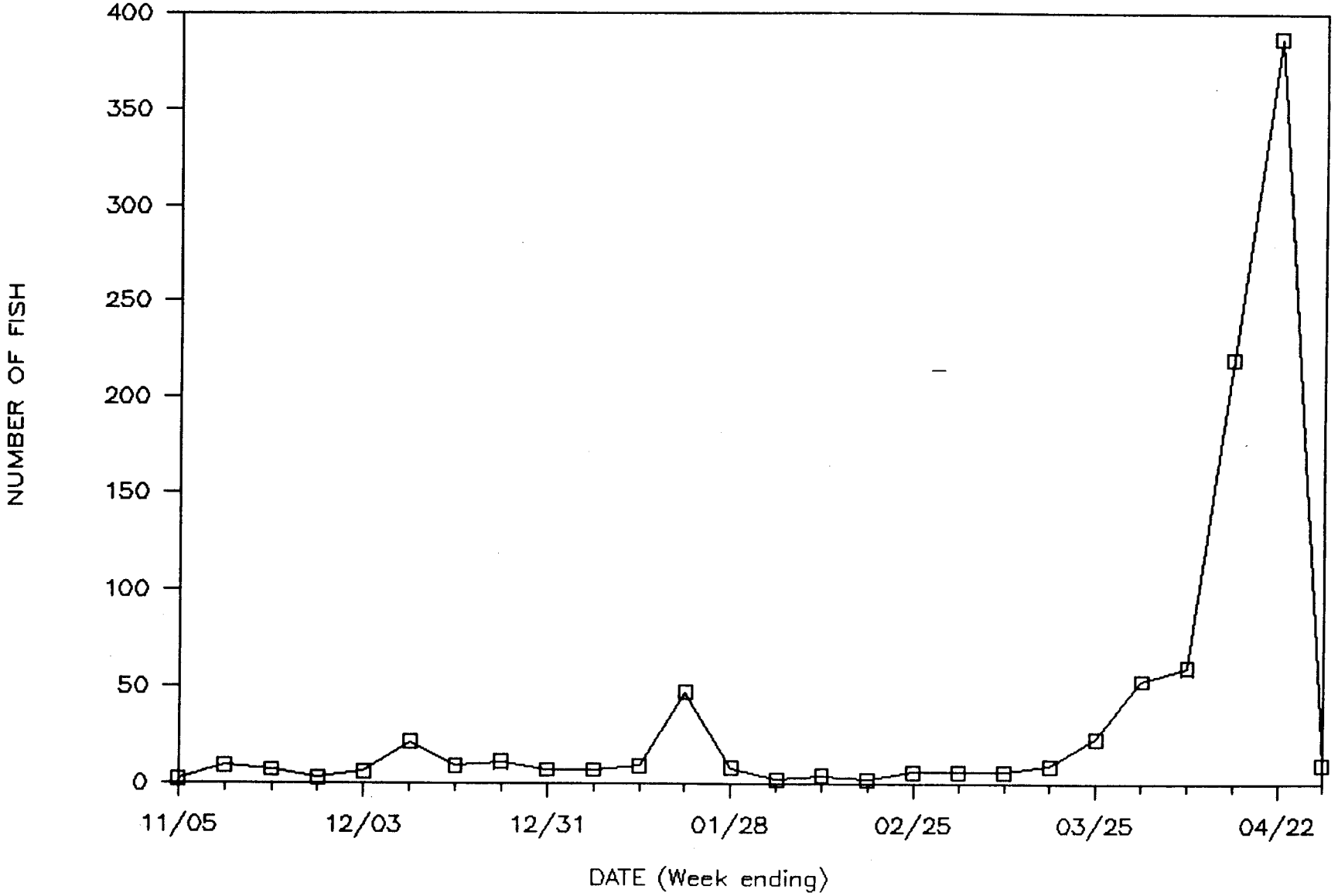


Figure 5. Prespawning mortality

of adult steelhead, Oxbow, 1988 – 89.



During spawning, the eggs of 39 (10.5% of the 373 females spawned) females were disposed of due to obvious symptoms of infection and excessively bloody ovarian fluid. Thirty-four (9.1% of females spawned) other females had bloody ovarian fluid, but their eggs were kept for incubation. Another 121 males were removed because of bloody sperm and external signs of bacterial infection.

Egg takes and survival varied (Table 1). Early takes (1 through 3) averaged 82.6% survival to eyed stage. Later takes (part of 3, all of 4 & 5) averaged 47.1% survival to eye-up. Causes of egg loss were from fungus, poor egg quality due to infected adults, poor fertilization rate due to bloody ovarian fluid, heavy silt loads, and poor flow through incubators with parts mixed from different manufacturers.

PRESPAWNING MORTALITY

Prespawning mortality included all males which died until the second week of spawning and all females that died before being spawned. Of the 1,540 females and the 1,189 males ponded at Oxbow, 486 females (31.6%) and 476 males (40.0%) died from various causes. Eight hundred and twenty-six (86.1% of the prespawning mortality) died with gross symptoms of bacterial infection, 123 (12.8%) died of unknown causes, and 11 (1.1%) died after jumping out of the holding ponds. There were no fish lost due to transportation or trapping.

STEELHEAD SPAWNING

Spawning operations began on April 6, and continued through April 20, 1989. A total of 373 females were spawned (eggs from 334 were kept) for a green egg take of 1,321,000, an average of 3,955 eggs per female.

Females were spawned using the incision method. Eggs were collected in a colander to drain the ovarian fluid. Eggs from two females were placed into a spawning bucket and fertilized with sperm from two or three males. The fertilized eggs were allowed to stand in two cups of well water for two to five minutes, rinsed once with well water, then water hardened in 100 ppm buffered Argentyne for one hour.

CARCASS DISPOSITION

All carcasses were checked for symptomatic signs of bacteria and other diseases, snouts were removed from marked fish, and all carcasses were then taken to the landfill for disposal.

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Table 1. Brood year 1989 steelhead egg survival.

Date	Take number	Green egg number	Eyed egg number	Percent survival	Position in stack	Type of tray*
04/06/89	1	44,972	35,080	78.0%	top	HT/HT**
04/07/89	2	118,898	107,450	90.4%	top	HT/HT
04/07/89	2	20,430	14,470	70.8%	top	FAL/FAL
04/10/89	3	25,425	20,425	80.3%	top	FAL/FAL
04/10/89	3	108,194	49,675	45.9%	top	HT/FAL
04/10/89	3	321,996	299,200	92.9%	top	HT/HT
04/10/89	3	100,385	29,700	29.6%	bottom	HT/FAL
04/13/89	4	6,250	3,700	59.2%	bottom	FAL/FAL
04/13/89	4	121,675	29,600	24.3%	bottom	HT/FAL
04/13/89	4	197,775	116,700	59.0%	bottom	HT/HT
04/20/89	5	255,000	166,500	65.3%	bottom	HT/HT
TOTALS		1,321,000	872,500	66.0%		

*HT = Heath Techna Manufactured
FAL = F.A.L./HEATH Manufactured

**Insert/Tray

STEELHEAD EGGS

Eggs from each spawning bucket were placed into the incubators (two females per bucket); approximately 8,000 eggs (1000 mis) per tray. Each stack received 4.8 to 5.0 gpm of incubation water. Incubation water ranged from a low of 47°F to a high of 61°F. After 72 hours of incubation, green eggs were treated with formalin at a rate of 1,667 ppm in a 15-minute drip. Treatments were on an every-other-day basis until water temperatures reached 55°F, when treatments were administered five days a week.

Eyed eggs were shocked, picked, and shipped to Niagara Springs Hatchery. A Jensorter egg-picker and counter (from McCall Hatchery) was used to determine the total number on hand, eye-up percentage, and number of eggs shipped to Niagara Springs. Volumetric displacement was used as a check against the counter. Survival in each tray from Takes 1, 2, 3, and 5 was used to compare differences of survival based on tray position within the double stack (top vs. bottom half), type of tray (Heath Techna vs. FAL), and take (early, mid, and late) (Table 1.).

SMOLT RELEASES

Steelhead smolt releases were conducted in the Spring of 1989. These releases were from the 1988 brood year raised at Niagara Springs Hatchery. A total of 179,500 pounds or 735,500 smolts were released below Hells Canyon Dam into the Snake River.

SPRING CHINOOK SALMON TRAPPING

Adults returning to the Hells Canyon Trap in 1989 were from smolt releases in 1985, 1986, and 1987 (jacks returns).

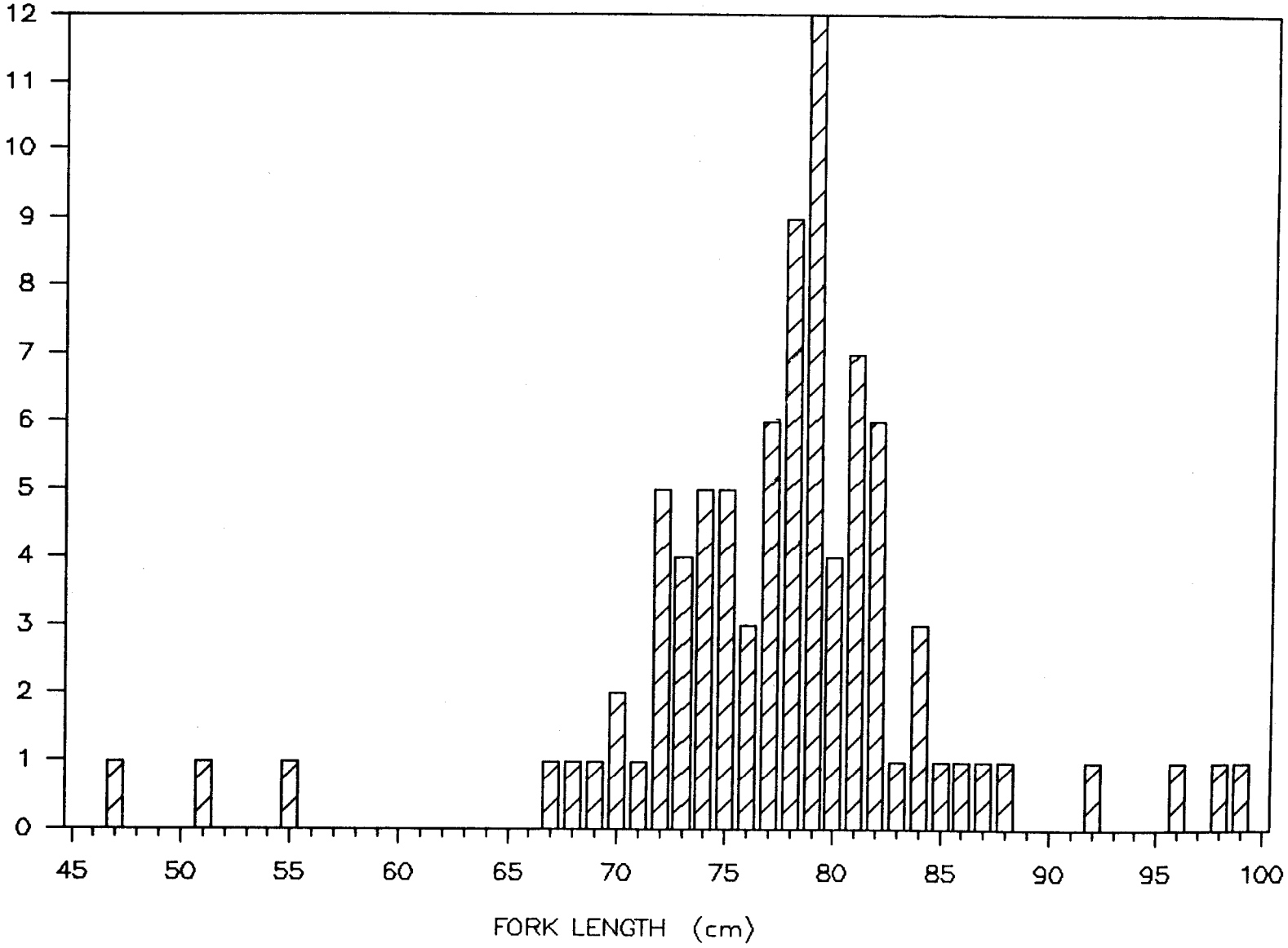
Spring chinook trapping began on May 23, and ended July 10, 1989. The trap operated a total of 960 hours, trapping 84 adults and 3 jacks (87 spring chinook).

All salmon were trucked to Oxbow Hatchery, anesthetized, measured for fork length, injected with erythromycin phosphate, and checked for tags and any other marks or wounds. There were no adipose-clipped fish, one (1.2%) jaw-tagged fish, 50 (59.5%) with gill net scars, 8 (9.6%) with nitrogen gas emboli, and 24 (27.6%) had other wounds or scars of uncertain origin.

Lengths of adult salmon ranged from 67 cm to 99 cm, with the mean size being 78.5 cm (Figure 6). Three jacks had a mean size of 51 cm.

Figure 6. length frequency distribution

of chinook salmon, Oxbow, 1989.



SPRING CHINOOK TRANSPORT

Four trips from Oxbow to Rapid River Hatchery were made to transport all the fish. There was no mortality at any stage this season. Water temperatures were reduced in the transport truck from 60°F to 40°F, 60°F to 48°F, 65°F to 55°F, and 67°F to 48°F, with the use of 800 to 900 pounds of block ice per trip.

SMOLT RELEASES

Chinook smolt releases in 1989 were conducted in the spring. These releases were from the 1987 brood year taken at Rapid River Hatchery. A total of 500,000 (25,000 lbs) spring chinook smolts were released into the Snake River below Hells Canyon Dam.

A P P E N D I X

Appendix 1. Run timing of adult steelhead, Hells Canyon-Oxbow, 1988-1989.

OXBOW HATCHERY – HELLS CANYON TRAPPING WEEKLY TOTALS						
Week of	Totals	Females	Males	# of trips from trap	# of hours trap in operation	Week ending
10/30-11/05	438	246	192	3	2.5	11/05
11/06-11/12	516	297	219	3	7.5	11/12
11/13-11/19	99	62	37	1	1.5	11/19
11/20-11/26	74	39	35	1	2.5	11/26
11/27-12/03	57	30	27	2	73.3	12/03
12/04-12/10	27	11	16	2	69.5	12/10
12/11-12/17	31	22	9	3	120.5	12/17
12/18-12/24	40	20	20	1	92.0	12/24
12/25-12/30	0	0	0	0	0.0	12/30
03/01-03/04	0	0	0	0	96.0	03/04
03/05-03/11	0	0	0	0	168.0	03/11
03/12-03/18	30	15	15	2	168.0	03/18
03/19-03/25	301	156	145	4	168.0	03/25
03/26-04/01	715	398	317	6	168.0	04/01
04/02-04/08	258	155	103	5	168.0	04/08
04/09-04/15	93	52	41	6	168.0	04/15
04/16-04/22	39	29	10	3	168.0	04/22
04/23-04/29	11	8	3	3	144.0	04/29
TOTALS 88-89	2,729	1,540	1,189	45	1,785.3	
FALL TOTALS	1,282	727	555	16	369.3	
SPRING TOTALS	1,447	713	634	29	1,416.0	

Appendix 2. Length frequency of female and male steelhead, Oxbow, 1988-1989.

Females		Males	
Total length (cm)	Number of fish	Total lenqth (cm)	Number of fish
40	2	41	1
41	1	42	2
42	2	43	4
43	3	44	2
44	10	45	1
45	7	46	2
46	2	47	3
47	1	48	1
48	1	49	6
49	3	50	6
50	1	53	2
51	1	55	5
52	3	56	5
53	5	57	22
54	3	58	19
55	5	59	39
56	7	60	47
57	19	61	85
58	28	62	83
59	63	63	101
60	87	64	96
61	91	65	74
62	109	66	62
63	76	67	90
64	74	68	25
65	44	69	17
66	35	70	17
67	38	71	19
68	34	72	27
69	56	73	35
70	78	74	26
71	128	75	38
72	91	76	41
73	89	77	29
74	113	78	35
75	74	79	26
76	43	80	17
77	35	81	30
78	34	82	26
79	21	83	6
80	9	84	4
81	5	85	5
82	2	86	1
83	3	87	2
84	1	89	2
85	3	92	1

Appendix 3. Prespawning mortality of adult steelhead, Oxbow Hatchery, 1988-1989.

Date (week ending)	Number of fish (mortality)
11/05	2
11/12	9
11/19	7
11/26	3
12/03	6
12/10	21
12/17	9
12/24	11
12/31	7
01/07	7
01/14	9
01/21	47
01/28	8
02/04	2
02/11	4
02/18	2
02/25	6
03/04	6
03/11	6
03/18	9
03/25	23
04/01	53
04/08	60
04/15	221
04/22	387
04/29	10

Appendix 4. Length frequency of chinook salmon, Hells Canyon-Oxbow Hatchery, 1989.

Fork length (cm)	Number of fish
47	1
51	1
55	1
67	1
68	1
69	1
70	2
71	1
72	5
73	4
74	5
75	5
76	3
77	6
78	9
79	12
80	4
81	7
82	6
83	1
84	3
85	1
86	1
87	1
88	1
92	1
96	1
98	1
99	1

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